

### **REMARKS**

This is a full and timely response to the outstanding final Office Action mailed October 19, 2006. The Examiner is thanked for the thorough examination of the present application. Upon entry of this response, claims 1-7, 9-22, and 25 are pending in the present application. Claims 1-7, 9-22, and 25 are rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Bratt et al. (U.S. Patent No. 6,877,020, hereinafter "*Bratt*"). Applicants have amended claim 18 to correct a minor typographical error. No new matter has been added. Applicants respectfully request consideration of the following remarks contained herein. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

#### **I. Response to Rejections Under 35 U.S.C. § 102(e)**

Claims 1-7, 9-22, and 25 stand rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by *Bratt*. It is axiomatic that "[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W. L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983). Therefore, every claimed feature of the claimed invention must be represented in the applied reference to constitute a proper rejection under 35 U.S.C. § 102(e). For at least the reasons set forth below, Applicants traverse the §102(e) rejections.

#### **Independent Claim 1 is Patentable Over Bratt**

Claim 1 stands rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by *Bratt*. Applicants respectfully traverse this rejection and submit that independent

claim 1 patently defines over *Bratt* for at least the reason that *Bratt* fails to disclose, teach or suggest certain features in claim 1.

Claim 1 recites:

1. A data converter for converting a group of vectors from a time serial to a time parallel format, wherein in the time serial format, sets of corresponding components of the vectors each have a time slot, and in time parallel format, each vector has a time slot, the converter comprising:
  - an input rotator configured to rotate each set of corresponding components of all time serial vectors by an amount that depends on the time slot of the set of corresponding components;
  - a bank of register files coupled to the input rotator to receive the rotated set of corresponding components, and having a register file in the bank configured to store each rotated set of corresponding components;
  - an output rotator coupled to the bank of registers files, for receiving and rotating the components of a vector an amount that depends on the time slot of the vector to generate a vector having time parallel format; and
  - a controller configured to control the addressing of the bank of register files when the corresponding components of each vector are stored in a register of the bank in horizontal and vertical write operations, and to control the addressing of the bank to collect the components of each vector for subsequent output rotation in horizontal and vertical read operations, said controller further configured to control alternating horizontal reading and writing and vertical reading and writing operations upon the bank of register files.

First, the Office Action alleges that "*Bratt* has taught a data converter for converting a group of vectors from a time serial to a time parallel format (**i.e. matrix transposition**), wherein in the time serial format, sets of corresponding components of the vectors each have a time slot, and in time parallel format, each vector has a time slot." (*Emphasis added*; Office Action, pg. 2) Applicants respectfully disagree and submit that the Examiner has not shown within particularity how *Bratt* teaches of a data converter that converts vectors from a time serial to a time parallel format. Among other things, the Office Action merely states that *Bratt* performs matrix transposition. While the Applicants agree that *Bratt* teaches of matrix transposition, Applicants respectfully submit that this does not equate to conversion of vectors from a time serial to a time

parallel format. As noted by *Bratt*, matrix transposition generally refers to “a linear algebra operation commonly used in many fields of applications, such as in signal and image processing. The software implementations of matrix transposition are computationally expensive. When implemented on a scalar CPU, matrix transposition is performed by reading the elements of a matrix one element at a time and storing them in a transposed order.” (*Emphasis added*; Col. 5, lines 29-35) Hence, Applicants submit that *Bratt* does not teach “A data converter for converting a group of vectors from a time serial to a time parallel format, wherein in the time serial format, sets of corresponding components of the vectors each have a time slot, and in time parallel format, each vector has a time slot” as recited in claim 1 above.

Even assuming, *arguendo*, that *Bratt* does teach of time serial to time parallel conversion of vectors, Applicants submit that *Bratt* does not teach each and every element of claim 1. For example, *Bratt* does not teach of “an input rotator configured to rotate each set of corresponding components of all time serial vectors by an amount that depends on the time slot of the set of corresponding components,” as alleged by the Office Action. The Office Action alleges that *Bratt* teaches “an input rotator (*components that implement operation 9511 as shown in Fig. 75 and described in column 50, lines 56-62*) configured to rotate each set of corresponding components of all time serial vectors (*a row of elements*) by an amount that depends on the time slot (*row number*) of the set of corresponding components [*Each row of elements is rotated by an amount the [sic] depends on the row number (See Fig. 75, component 9511; column 50, lines 56-62)*]. (Office Action, pg. 2-3)

First, the Office Action alleges, without particularity, that *Bratt* discloses an input rotator. The Office Action refers to “components that implement operation 9511 in Fig. 75 and described in column 50, lines 56-62).” The text cited by the Office Action is as follows:

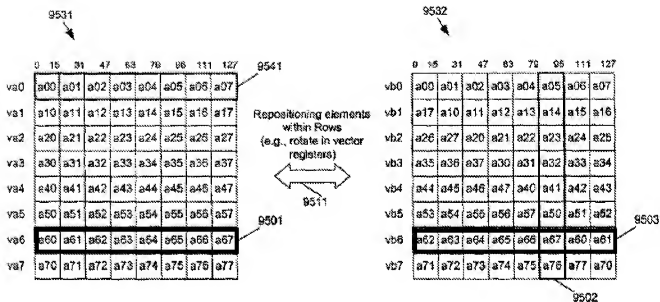
**FIG. 75 shows methods to transpose a matrix using operations that change the positions of elements within rows or within columns. In FIG. 75, operations 9511, 9513 and 9515 transpose matrix 9531 into matrix 9534. Operation 9511 repositions elements within rows to generate matrix 9532. For example, row 9501 (vector va6) may be rotated in a vector register to generate row 9503 (vector vb6).**

(*Emphasis added*; Col. 50, lines 56-62) As seen in the text above, Fig. 75 shows methods for changing the positions of elements within rows or within columns. Applicants submit that the text does not teach “an input rotator configured to rotate each set of corresponding components of all time serial vectors by an amount that depends on the time slot of the set of corresponding components.” Apparently, the Office Action equates “a row of elements” with “time serial vectors” recited in claim 1. Applicants submit that “a row of elements” is very general phrase and is not equivalent to “time serial vectors.” In essence, the system of *Bratt* simply changes rows to columns and vice versa (see reference numbers 9531 to 9534 of FIG. 75).

To illustrate this contrast, refer to items X4, X5, X6, X7 of FIG. 3 of the present application. As seen by the grouping of these boxes at reference number 30, item X4 is in the leftmost position. After the rotations of the illustrated embodiment, item X4 remains in the leftmost position (see the grouping of boxes at reference number 18). Simply stated, the method illustrated in FIG. 75 of *Bratt* could not achieve this result (i.e., item X4 remaining in the same location). This illustrates a distinctive operation of the present application, which results from the distinctly claimed structure.

Furthermore, the Office Action appears to equate "an amount that depends on the time slot" with "row number" in the *Bratt* reference. Again, Applicants submit that this is a very general comparison and the two concepts are not equivalent.

*Bratt* simply does not teach the following: "rotate each set of corresponding components of all time serial vectors by an amount that depends on the time slot of the set of corresponding components." In asserting that *Bratt* teaches this feature, the Office Action refers to FIG. 75 and Col. 50, lines 56-62. However, Applicants submit that this feature is not supported in FIG. 75. As shown in the cited text above in describing FIG. 75, *Bratt* teaches: "For example, row 9501 (vector va6) may be rotated in a vector register to generate row 9503 (vector vb6)." As seen in both the figure and the text of the *Bratt* reference, there is no discussion that each set of corresponding components in the time serial vectors are rotated by an amount that depends on the time slot of the set of corresponding components. "Operation 9511," as referred to by the Office Action, merely "repositions elements within rows to generate matrix 9532." (Col. 50, lines 59-61) This is shown the FIG. 75 of the *Bratt* reference below (refer to bold boxes):



Applicants submit that merely repositioning elements in a given row is not equivalent to the following: "rotate each set of corresponding components of all time serial vectors by an amount that depends on the time slot of the set of corresponding components," as recited in claim 1. (Applicants refer the Examiner to the elements in rows 9501 and 9503 above.)

Accordingly, Applicants submit that independent claim 1 patently defines over *Bratt* for at least the reason that *Bratt* fails to disclose, teach or suggest certain features in claim 1.

**Dependent Claims 2-7 and 9-11 are Patentable Over Bratt**

Because independent claim 1 patently defines over *Bratt*, dependent claims 2-7 and 9-11 are allowable over *Bratt* as a matter of law for at least the reason that these claims contain all the features and elements of their corresponding independent claim. See, e.g. *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

**Independent Claim 12 is Patentable Over Bratt**

Claim 12 stands rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by *Bratt*. Applicants respectfully traverse this rejection and submit that independent claim 12 patentably defines over *Bratt* for at least the reason that *Bratt* fails to disclose, teach or suggest certain features in claim 12.

Claim 12 recites:

12. A method for converting a group of vectors from a time serial to a time parallel format, wherein in the time serial format, sets of corresponding components of the vectors each have a time slot, and in time parallel format, each vector has a time slot, the method comprising:  
for each set of corresponding components,  
rotating the corresponding components an amount that depends on the time slot of the corresponding component;  
writing each set of rotated corresponding components in a separate set of registers in a bank of register files; and  
for each vector in the group,  
reading selected registers in the bank to collect the components of the vector; and  
rotating the collected components of the vector an amount that depends on the time slot of the vector to generate a vector in time parallel format;  
wherein writing each set of corresponding components and reading the vector components is performed either horizontally or vertically, in an alternating fashion.

The Office Action applies the same arguments used in rejecting claim 1 for claim 12. (Office Action, pg. 6) Applicants again respectfully submit that the Examiner has not shown within particularity how *Bratt* teaches of a data converter that converts vectors from a time serial to a time parallel format. Furthermore, *Bratt* simply does not teach "for each set of corresponding components, rotating the corresponding components an amount that depends on the time slot of the corresponding component," as recited in claim 12 above. In asserting that *Bratt* teaches this feature, the Office

Action refers to FIG. 75 and Col. 50, lines 56-62. However, Applicants point out that this is not supported in FIG. 75. As shown in the cited text above in describing FIG. 75, *Bratt* teaches: "For example, row 9501 (vector va6) may be rotated in a vector register to generate row 9503 (vector vb6)." As seen in both the figure and the text of the *Bratt* reference, there is no discussion that each set of corresponding components in the time serial vectors are rotated by an amount that depends on the time slot of the set of corresponding components. "Operation 9511," as referred to by the Office Action, merely "repositions elements within rows to generate matrix 9532." (Col. 50, lines 59-61) Applicants submit that merely repositioning elements in a given row is not equivalent to the following: "rotating the corresponding components an amount that depends on the time slot of the corresponding component," as recited in claim 12. (Applicants refer the Examiner to the elements in rows 9501 and 9503 above.)

Accordingly, Applicants submit that independent claim 12 patently defines over *Bratt* for at least the reason that *Bratt* fails to disclose, teach or suggest certain features in claim 12.

**Dependent Claims 13-17 are Patentable Over Bratt**

Because independent claim 12 patently defines over *Bratt*, dependent claims 13-17 are allowable over *Bratt* as a matter of law for at least the reason that these claims contain all the features and elements of their corresponding independent claim. See, e.g. *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

**Independent Claim 18 is Patentable Over Bratt**

Claim 18 stands rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by *Bratt*. Applicants respectfully traverse this rejection and submit that independent claim 18 patentably defines over *Bratt* for at least the reason that *Bratt* fails to disclose, teach or suggest certain features in claim 18.

Claim 18 recites:

18. A data converter for converting a group of vectors from a time serial to a time parallel format, wherein in the time serial format, sets of corresponding components of the vectors each have a time slot, and in time parallel format, each vector has a time slot, the converter comprising:

input rotation means for rotating each set of corresponding components of all vectors by a first prescribed amount depending on the particular set;

storage means coupled to the input rotation means, for storing the rotated set of corresponding components; and

output rotation means coupled to the storage means, for receiving components of a vector from the storage means and rotating the components of the vector by a second prescribed amount depending on the particular vector to generate a vector in time parallel format; and

controller means, communicably coupled to the input rotator means, the storage means and the output rotator means, for controlling the writing and reading of the vector components to the storage means and the rotation of the vector components by the output rotation means and the input rotation means, and for controlling said reading and writing operations horizontally and vertically, said horizontal operations alternating with said vertical operations.

The Office Action applies the same arguments used in rejecting claim 1 for claim 18. (Office Action, pg. 6) Applicants respectfully submit that the Examiner has not shown within particularity how *Bratt* teaches of a data converter that converts vectors from a time serial to a time parallel format. Furthermore, *Bratt* simply does not teach "for each set of corresponding components, rotating the corresponding components an amount that depends on the time slot of the corresponding component," as recited in claim 18 above. In asserting that *Bratt* teaches this feature, the Office Action refers to FIG. 75 and Col. 50, lines 56-62. However, Applicants point out that

this is not supported in FIG. 75. As shown in the cited text above in describing FIG. 75, *Bratt* teaches: "For example, row 9501 (vector va6) may be rotated in a vector register to generate row 9503 (vector vb6)." As seen in both the figure and the text of the *Bratt* reference, there is no discussion that each set of corresponding components in the time serial vectors are rotated by an amount that depends on the time slot of the set of corresponding components. "Operation 9511," as referred to by the Office Action, merely "repositions elements within rows to generate matrix 9532." (Col. 50, lines 59-61) Applicants submit that merely repositioning elements in a given row is not equivalent to the following: "rotating the corresponding components an amount that depends on the time slot of the corresponding component," as recited in claim 18. (Applicants refer the Examiner to the elements in rows 9501 and 9503 above.)

Accordingly, Applicants submit that independent claim 18 patently defines over *Bratt* for at least the reason that *Bratt* fails to disclose, teach or suggest certain features in claim 18.

**Dependent Claims 19-22 and 25 are Patentable Over Bratt**

Because independent claim 18 patently defines over *Bratt*, dependent claims 19-22 and 25 are allowable over *Bratt* as a matter of law for at least the reason that these claims contain all the features and elements of their corresponding independent claim. See, e.g. *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

**CONCLUSION**

Applicants respectfully submit that all pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

No fee is believed to be due in connection with this response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 20-0778.

Respectfully submitted,



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